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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/645,903	08/25/2000	Li Li	2269-3361.2US (97-0663.02)	6825
24247	7590	08/20/2007	EXAMINER	
TRASK BRITT P.O. BOX 2550 SALT LAKE CITY, UT 84110			SUCH, MATTHEW W	
			ART UNIT	PAPER NUMBER
			2891	
			MAIL DATE	DELIVERY MODE
			08/20/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

09/645,903

Applicant(s)

LI, LI

Examiner

Matthew W. Such

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 04 June 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 10-31 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 10-20 is/are allowed.
- 6) ☒ Claim(s) 21 is/are rejected.
- 7) ☒ Claim(s) 22-31 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## **DETAILED ACTION**

### ***Claim Rejections - 35 USC § 112***

1. Claim rejections in the Office Action dated 3 April 2007 under 35 U.S.C. 112, first paragraph, to claims 22-23 and 25-31 have been withdrawn.

### ***Claim Rejections - 35 USC § 103***

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Krautschneider (WO 97/03469; the Examiner refers to English equivalent US 5,943,572 for the purposes of the present Office Action) in view of Hu (US 5,511,020).

4. Regarding claim 21, Krautschneider teaches a method of forming a via in a dielectric layer (Element 5; Figs. 2-3) and an underlying barrier layer (Element 6; Figs. 2-3) for a semiconductor device, such as a flash memory. A partial via (Element 4; Figs. 2-3) is formed in the dielectric layer to expose at least a portion of the barrier layer (Fig. 2). The partial via is

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cleaned with a phosphoric acid containing solution (Col. 6, Lines 55-60). The barrier layer is etched with a nitric acid containing solution after the cleaning (Col. 6, Lines 61-65) forming a full via containing a trace (Element 6'; Fig. 3) on the bottom surface thereof. Since the nitric acid containing solution is applied to the full via the instant etching is completed.

Krautschneider teaches that the trace (Element 6') is a polysilicon floating gate electrode for a memory cell and does not teach that the trace is a metal containing material.

Hu teaches using polysilicon, silicide (metal containing polysilicon) and metal materials as floating gate electrodes in memory cells (Col. 4, Lines 2-4 and 33-35). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the floating gate trace of Krautschneider with, for example, a metal containing material such as a silicide, as taught by Hu since the materials are conventional functional equivalents for floating gate electrodes in memory cells. It has been held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960). MPEP § 2144.07.

### ***Response to Arguments***

5. Applicant's arguments filed 4 June 2007 regarding the rejection of claim 21 under 35 U.S.C. 103(a) has been fully considered but they are not persuasive.

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a. The Applicant argues that Krautschneider in view of Hu do not teach the step of “forming a partial via in the dielectric layer to expose at least a portion of the barrier layer” since Krautschneider teaches forming the barrier layer (Element 6) after the formation of the via (see Remarks Page 9). In response, the Examiner notes that the manner in which the claim is written does not limit what specific steps may be used to form the partial via and does not define what constitutes a “partial via”. Therefore, any steps can be used to form the partial via so long as at some point in the method, a barrier layer is exposed.

b. The Applicant argues that Krautschneider in view of Hu does not teach “etching the barrier layer after cleaning to form a full via having a metal trace on a bottom surface thereof; and applying a nitric acid-containing solution to the full via” since Krautschneider teaches etching the barrier layer (Element 6) with a nitric acid containing solution. However, in response, the Examiner notes that the manner in which the claim is written does not limit an interpretation whereby the nitric acid etches the barrier layer to form the full via. The instant the barrier layer is etched with a nitric acid containing solution and the full via is formed, the nitric acid will necessarily be applied to the full via.

***Allowable Subject Matter***

6. Claims 10-20 are allowed.

7. The following is an examiner's statement of reasons for allowance of claims 10-20: A search of the prior art does not disclose or reasonably suggest a method of removing oxide and metal polymer from a opening in a dielectric layer with a metal-containing layer therein by applying nitric acid followed by phosphoric acid.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

8. Claims 22-31 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

9. The following is a statement of reasons for the indication of allowable subject matter: A search of the prior art does not disclose or reasonably suggest a method of forming a via in a dielectric layer and underlying barrier layer by forming a partial via exposing the barrier layer and cleaning the partial via with phosphoric acid, followed by etching to barrier layer to form a full via have a metal-containing trace on the bottom surface and applying nitric acid, for example, for 200 seconds, or any other of the limitations of claims 22-31.

***Conclusion***

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew W. Such whose telephone number is (571) 272-8895. The examiner can normally be reached on Monday - Friday 9AM-5PM EST.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bradley W. Baumeister can be reached on (571) 272-1722. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew W. Such  
Examiner  
Art Unit 2891

MWS  
8/13/07



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